Development And Validation Of Quizizz Media For Ipas Learning In Primary Schools

Wahudi[1], Yoga Prihatin[2] & Sutji Muljani[3]

[1]Master of Pedagogy, Postgraduate Program, Pancasakti Tegal University, Indonesia.

[2,3]English Education, Universitas Pancasakti Tegal, Indonesia.

Corresponding Author: Wahudi, **Email**: wahudipemalang01@gmail.com

ABSTRACT

This study aims to develop and validate Quizizz-based learning media for the Science subject, specifically on force and motion, for fifth-grade elementary school students. The research method used is Research and Development (R&D) with the ADDIE model, limited to the Development stage. The research subjects included 20 students and 3 teachers for needs analysis, as well as 9 expert validators (3 subject matter experts, 3 language experts, and 3 media experts). The research instruments were a needs analysis questionnaire and a validation sheet using the Aiken index. The data were analysed descriptively and quantitatively. The needs analysis results showed that teachers and students had a strong need for interactive media, with an average score of 3.48-3.55 (69.6%-71%). The expert validation results showed that the media was highly valid, with Aiken indices of content validity 0.925 (80% of indicators reached 1.00), language validity 0.94, and media validity 0.91. All items in the instrument were in the range of 0.67-1.00, with the majority ≥0.80 (highly valid). A small-group trial (6 students) showed initial effectiveness, with an average score increase from 43.75 to 93.33 (N-Gain = 0.86; high category) and 100% mastery. The study concluded that the developed Quizizz media met the criteria of validity, feasibility, and potential for implementation in IPAS learning in primary schools.

Keywords: Media Development, Quizizz, Validation, IPAS, Primary School

INTRODUCTION

Educational transformation in the digital era demands innovation in learning media development to improve the quality of the learning process and student outcomes. Science and Social Studies (IPAS), as an integrated subject in the Merdeka Curriculum, requires an approach that engages students and facilitates an in-depth understanding of concepts (Ministry of Education and Culture, 2022). However, the reality in the field shows that IPAS learning still faces various challenges, especially related to the use of learning media that are not innovative enough.

Initial observations in the Pattimura Cluster, Taman Subdistrict, Pemalang Regency, show that, of seven primary schools, five teachers rarely use learning media in their teaching and learning. Learning is still dominated by lecture methods with minimal use of media, causing students to lose focus and interest. This condition affects learning outcomes, as at SDN 02 Sokawangi the average IPAS score is 65, with only 25% of 26 students passing.

Vygotsky's social constructivism theory (1978) emphasises that learning is an active process in which students construct their knowledge through interaction with their environment and social mediation. In the context of Grade 5 IPAS learning, students in the concrete operational stage (Piaget, 1952) need media that bridge abstract concepts, making them more concrete and easier to understand. Interactive digital learning media can facilitate this knowledge construction process by providing a more meaningful learning experience.

Quizizz is a gamification-based learning platform that integrates game elements into the learning context. This platform offers pedagogical features such as interactive quizzes, instant feedback, leaderboards, and a points system that can increase student motivation and engagement (Yong & Rudolph, 2022). Gamification in learning aligns with Self-Determination Theory, which emphasises the importance of fulfilling basic psychological needs—competence, autonomy, and social connectedness—to increase intrinsic motivation (Sailer & Homner, 2020).

LITERATURE REVIEW

Interactive digital learning media are tools created and utilised on digital devices to convey learning messages through two-way interaction between users and the media (Mayer, 2020). The main characteristics of interactive digital media include the ability to integrate text, audio,

video, and other interactive elements, thereby providing a more engaging and effective learning experience.

The criteria for effective learning media according to Putra & Salsabila (2021) include: (1) effectiveness and efficiency in achieving learning objectives, (2) suitability to the students' level of thinking, (3) interactivity that encourages active engagement, (4) availability and accessibility, (5) teachers' ability to use, (6) appropriate time allocation, (7) flexibility of use, and (8) security. These criteria are an important foundation in the development of Quizizz media for IPAS learning.

Quizizz is an interactive learning platform founded in 2015, enabling educators to create and share quizzes with students digitally (Educational Equity Institute, 2024). Quizizz's unique features include: (1) gamification features with leaderboards, avatars, and memes; (2) flexibility in terms of time and place of access; (3) a game-based approach that increases engagement; (4) instant feedback; and (5) multimedia support.

Research by Kartika & Hidayanto (2025) shows that Quizizz makes teaching and learning activities enjoyable because it prioritises learning styles that involve active student participation. Quizizz's pedagogical features, such as interactive learning through quiz games, multiple-choice formats with instant scores, the ability to create your own quizzes, and real-time online discussions, have been proven effective in increasing student engagement (Yong & Rudolph, 2022).

Several previous studies have demonstrated the effectiveness of developing Quizizz media. Permatasari et al. (2024) developed Quizizz gamification media for Grade V IPAS learning with a final validation result of 94% (highly feasible) and an increase in learning outcomes from an average of 61.33 to 91.43. Rosman (2024) developed interactive game-based Quizizz media for Grade IV IPAS with material validity of 96.6%, design and media of 92.18%, language of 97.22%, and teacher practicality of 94.27% and student practicality of 97.93%.

Rahmawati & Farida (2024) developed Quizizz media for Grade V IPAS with material validity of 90%, media of 86.25%, language of 100%, teacher practicality of 93.75%, student practicality of 94.85%, and high effectiveness (90.9%-95.45%). Maesaroh (2022) developed Quizizz based on blended learning for Grade V Science with effective validity and practicality test results and a significant increase in learning achievement.

Although previous studies have shown positive results, most of them focus on aspects of improving learning outcomes or the general feasibility of the media. There have not been many studies that deeply integrate needs analysis, the systematic development process with the ADDIE model, and comprehensive validation from various experts. This study fills that gap by developing Quizizz media through a more structured procedure and more comprehensive validation.

Based on the background and theoretical review, this study aims to:

1. Analyse the needs of teachers and students for the development of Quizizz learning media in the subject of Science for Grade V of elementary school.

2. Designing and developing Quizizz learning media that is suitable for Year 5 primary school students for the subject of force and motion

3. Testing the feasibility of Quizizz learning media through validation by subject matter experts, language experts, and media experts

4. Evaluating the initial effectiveness of Quizizz media through small group trials

METHODOLOGY

This study utilised the Research and Development (R&D) method with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model developed by Dick and Carey (1996). The ADDIE model was chosen because it is systematic, iterative, and flexible, allowing for revisions after each stage to minimise errors and encourage continuous improvement (Sugiyono, 2019).

This study is limited to the Development stage, in accordance with the first type of Design and Development Research (DDR) paradigm proposed by Richey & Klein (2007), where the focus of the study is on the process of creating a product and establishing its validity, rather than on testing its effectiveness on a large scale. This approach is considered appropriate because the main objective is to produce a Quizizz media prototype that meets the feasibility criteria, namely content and construct validity, as well as practicality.

The research was conducted at SD Gugus Pattimura, Taman District, Pemalang Regency, specifically at SDN 02 Sokawangi and SDN 03 Sokawangi, during the period of August-

September 2025. The location was selected based on accessibility, relevance to the research problem, and the availability of adequate technological facilities.

Research subjects at each stage:

Analysis stage:

- 20 fifth-grade students at Gugus Pattimura Elementary School (purposive sampling)

- 3 fifth grade teachers at Pattimura Cluster Elementary School

Validation stage:

- 3 IPAS subject matter experts (experienced fifth-grade teachers who are members of the KKG)

- 3 language experts (experts in applied linguistics and Indonesian language)

- 3 media experts (educational technology and media design experts)

Development Stage (Product Testing):

- 6 fifth-grade students from SDN 02 Sokawangi (selected heterogeneously based on high, medium, and low academic ability)

Development Procedure

1. Analysis Stage (Needs Analysis)

This stage aims to identify the needs of students and teachers regarding IPAS learning media. Activities include:

- Observation of IPAS learning in Grade 5

- Interviews with fifth grade teachers about learning obstacles

- Distribution of needs analysis questionnaires to students and teachers

- Documentation study of IPAS syllabus and teaching materials

2. Design Stage (Product Design)

The design stage includes:

- Formulation of specific learning objectives with reference to IPAS Phase C Learning Outcomes

- Preparation of competency achievement indicators

- Designing the content structure of style and movement materials

- Development of question grids and evaluation instruments

- Designing flowcharts and storyboards for Quizizz media

- Designing the interface with gamification elements (colours, avatars, point system, leaderboard)

3. Development Stage (Development and Validation)

The development stage includes:

- Collection and development of style and motion materials

- Creation of multimedia content (images, videos, animations)

- Preparation of 20 context-based multiple-choice questions

- Creation and development of comprehensive Quizizz media

- Integration of materials with Quizizz features

- Preparation of user guides for teachers

- Validation of media by subject matter experts, language experts, and media experts

- Analysis of validation results and product revision

- Small group testing

Data Collection Instruments

1. Student Needs Analysis Questionnaire

The questionnaire for students consists of 37 statements using a 1-5 Likert scale, covering the following aspects:

- Perceptions of IPAS subjects (7 items)

- Current learning conditions (7 items)

- Experience with technology and educational games (7 items)

- Digital learning media needs (8 items)

- Expectations for using Quizizz (8 items)

2. Teacher Needs Analysis Questionnaire

The questionnaire for teachers consists of 20 statements using a 1-5 Likert scale, covering the following aspects:

- Current learning conditions (4 items)

- Needs and expectations regarding learning media (4 items)

- Knowledge and experience with Quizizz media (4 items)

- Perceptions of the effectiveness of Quizizz (4 items)

- Supporting and hindering factors for implementation (4 items)

3. Subject Matter Expert Validation Sheet

The content validation instrument consists of 15 assessment items covering the following aspects:

- Curriculum relevance (4 items)

- Conceptual accuracy (4 items)

- Material coverage (4 items)

- Contextual relevance (3 items)

4. Language Expert Validation Sheet

The language validation instrument consists of 25 assessment items covering the following aspects:

- Accuracy of language use (5 items)

- Sentence effectiveness (5 items)

- Appropriateness to the students' level of development (5 items)

- Clarity of information (5 items)

- Language appeal (5 items)

5. Media Expert Validation Sheet

The media validation instrument consists of 25 assessment items covering the following aspects:

- Display quality (5 items)

- Audio quality (4 items)

- Technical aspects (4 items)

- Interactivity (4 items)

- Pedagogical (5 items)

All validation instruments use a 1-5 Likert scale with the following criteria: 1=Poor, 2=Fair, 3=Average, 4=Good, 5=Very Good.

Data Analysis Techniques

1. Needs Analysis

The needs survey data was analysed using descriptive statistics by calculating:

- Average score per aspect

- Percentage of positive responses

- Frequency distribution

Percentage calculation formula:

$$\text{Percentage} = \frac{\text{Total Score}}{\text{Maximum Score}} \times 100\%$$

2. Instrument Validity and Reliability Test

The validity of the questionnaire instrument was tested using Pearson Product-Moment correlation, with items declared valid if r_count ≥ r_table (Sugiyono, 2019). Reliability was analysed using Cronbach's Alpha coefficient, with a minimum value of 0.70 as an indicator of acceptable reliability (Mulyani et al., 2025).

3. Product Validity Analysis (Aiken Index)

Product validity was analysed using the Aiken index with the formula:

$$V = \frac{\sum s}{n(c - 1)}$$

Where:

- V = Aiken's index

- s = r - lo (r = validator score, lo = lowest score)

- n = number of validators

- c = number of assessment categories

Validity criteria:

- V ≥ 0.80 = Highly valid

- 0.60 ≤ V < 0.80 = Valid

- 0.40 ≤ V < 0.60 = Sufficiently valid

- V < 0.40 = Not valid

4. Initial Effectiveness Analysis (N-Gain)

The initial effectiveness of the product in small group trials was analysed using N-Gain:

$$g = \frac{\text{Posttest} - \text{Pretest}}{\text{Maximum Score} - \text{Pretest}}$$

N-Gain criteria (Hake, 1999):

- $g \geq 0.7$ = High

- $0.3 \leq g < 0.7$ = Moderate

- $g < 0.3$ = Low

DISCUSSION

Results of the Analysis Stage (Needs Analysis)

1. Results of the Validity and Reliability of the Questionnaire Instrument

The validity test of the teacher needs questionnaire (20 items, 10 respondents, r_table = 0.632) showed Pearson correlation results ranging from r = 0.349 to r = 1.000 with most items being significant ($p < 0.05$). The reliability analysis using Cronbach's Alpha showed a value of α = 0.887 (> 0.70), indicating good internal consistency of the instrument.

The validity test of the student needs questionnaire (37 items, 20 respondents) showed that the majority of items were valid with positive and significant correlations. The Cronbach's Alpha reliability value reached α = 0.912, indicating that the instrument was highly reliable for measuring student needs for learning media.

2. Results of Teacher Needs Analysis

The analysis of teacher needs from 10 respondents showed the following results:

Table 1: *Results of Teacher Needs Analysis*

Aspect	Average Score	Percentage	Interpretation
Current Learning Conditions	3.5	70.0	High
Needs and Expectations Regarding Media	3.50	70.0	High

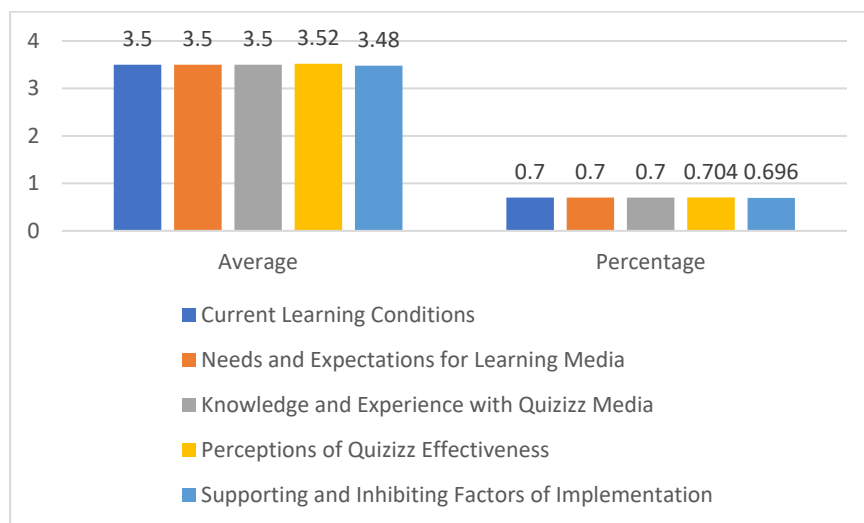| Knowledge and Experience with Quizizz	3.5	70.0	High
Perception of Quizizz Effectiveness	3.52	70.4	Very High
Supporting and Inhibiting Factors	3.48	69.6	High
Overall Average	**3.50**	**70.0**	**High**

Figure 1: Results of Teacher Needs Analysis

Key findings from the teacher needs analysis:

- 96% of teachers require a variety of methods or media to make science learning more interesting

- 95% of teachers need interactive learning media to increase student participation

- 93% of teachers want to integrate technology into IPAS learning and need easy-to-use digital media

- 93% of teachers understand how to use Quizizz for learning

- 94% of teachers believe Quizizz makes students more active in answering questions

- 95% of teachers consider Quizizz suitable for primary schools and helpful for easy evaluation

- 90% of teachers require special training to use Quizizz optimally

- 89% of teachers consider the internet connection at school to be adequate

3. Results of Student Needs Analysis

Analysis of student needs from 30 respondents shows the following results:

Table 2: *Results of Student Needs Analysis*

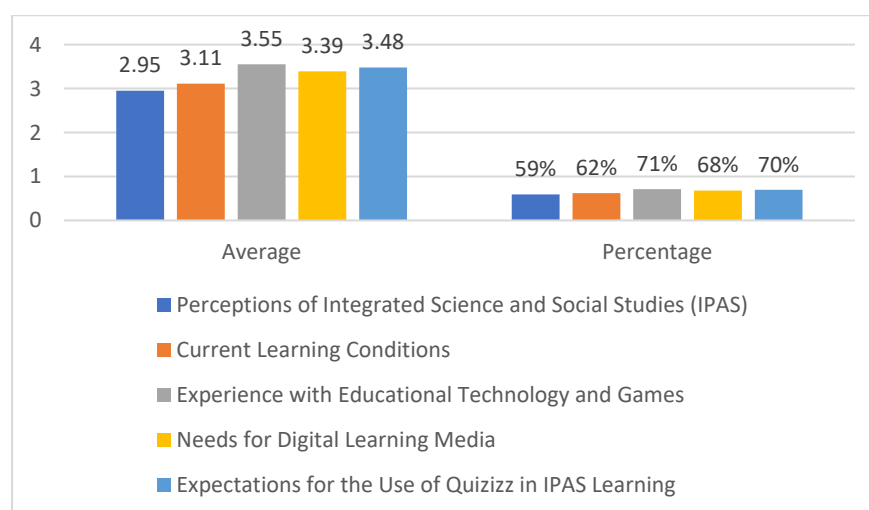| Aspect	Average Score	Percentage	Interpretation
Perception of IPAS Subject	2.95	59.0	Moderate
Current Learning Conditions	3.11	62.2	High
Experience with Technology and Educational Games	3.55	71.0	Very High
Need for Digital Learning Media	3.39	67.8	High
Expectations for Using Quizizz	3.48	69.6	High
Overall Average	**3.30**	**66.0**	**High**

Figure 2: Results of Student Needs Analysis

Key findings from the student needs analysis:

- 83% of students find it easier to understand with the use of engaging learning media

- 90% of students have played educational games

- 90% of students find it easy to learn using new applications

- 83% of students have a high need to learn with online games/quizzes

- 83% of students believe educational games help them understand IPAS

- 90% of students expect IPAS learning to be enjoyable with Quizizz

- 90% of students expect Quizizz to help them understand IPAS material

4. Synthesis of Needs Analysis Results

The results of the needs analysis show that both teachers and students have positive perceptions, high needs, and good technological readiness for utilising Quizizz. The average needs scores for teachers (3.50) and students (3.30) indicate that Quizizz is a feasible, relevant, and promising learning medium for use in IPAS learning in primary schools. The high level of students' digital experience (3.55) reinforces that the integration of Quizizz is well accepted and aligned with today's students' characteristics.

Design Phase Results (Product Design)

Based on the needs analysis results, the Quizizz media was designed with the following specifications:

1. Learning Objectives

The learning objectives are formulated with reference to the IPAS Phase C Learning Outcomes:

- Students are able to explain the effect of force on the motion of objects through simple observations

- Students demonstrate active participation in conducting simple experiments on force and motion

- Students are able to answer questions based on the phenomena of force and motion through the Quizizz media

2. Content and Material Structure

The force and motion material is developed with the following structure:

- Introduction to the concept of force (definition, types of force)

- Muscle force, gravity, magnetic force, and friction

- The effect of force on the motion and shape of objects

- The relationship between force and the direction and speed of motion

- Application of the concept of force in everyday life

3. Question Grid and Instruments

Developed 20 context-based multiple-choice questions with the following distribution:

- C1 (Recalling): 3 questions

- C2 (Understanding): 9 questions

- C3 (Applying): 5 questions

- C4 (Analysing): 3 questions

The scoring system uses a dichotomous model (1 for correct, 0 for incorrect).

4. Visual Design and Gamification

Quizizz media design includes:

- Background colour: light blue (symbolising energy and focus)

- Cute avatar characters to attract students' interest

- A points and ranking system (leaderboard)

- Immediate feedback in the form of motivational memes or appreciative messages

- Integration of images, videos, and animations in each question

- Time limits to improve concentration

Development Stage Results (Development and Validation)

1. Product Development

Quizizz media was developed in the following stages:

- Creation of high-quality multimedia content

- Integration of materials with the Quizizz platform

- Development of 20 interactive questions with images and animations

- Configuration of gamification features (points, leaderboard, timer)

- Preparation of user guides for teachers

- Technical testing of media (compatibility, loading, responsiveness)

2. Results of Content Expert Validation (Content Validity)

Content validation was conducted by 3 subject matter experts (experienced Year 5 teachers) with the following results:

Table 3: *Results of Content Expert Validation (Content Validity)*

Aspect	Number of Items	Average V	Category
Curriculum Relevance & Competency	4	1.0	Highly Valid
Conceptual Accuracy of Style & Movement	4	1.0	Highly Valid
Completeness & Depth of Material	4	1	Very Valid
Relevance to Life	3	0.96	Highly Valid
Overall Average	**15**	**0.925**	**Highly Valid**

Detailed results show:

- 12 indicators (80%) obtained a perfect score of V = 1.00

- 3 indicators (20%) obtained a value of V = 0.89

- All indicators meet the high validity standard (V ≥ 0.80)

The aspects of alignment with learning outcomes, conceptual accuracy, completeness of application examples, and relevance to student experiences achieved perfect validity. A slight variation in support for the Pancasila Student Profile (V = 0.89) indicates some room for improvement.

3. Language Expert Validation Results

Language validation was conducted by 3 language experts with the following results:

Table 4: *Language Expert Validation Results*

Aspect	Number of Items	Average V	Category
Accuracy of Language Use	5	0.96	Highly Valid
Sentence Effectiveness	5	0.93	Highly Valid
Suitability for Primary School Students	5	0.91	Highly Valid
Clarity of Information	5	0.95	Highly Valid
Language Appeal	5	0.94	Highly Valid
Overall Average	**25**	**0.94**	**Highly Valid**

The results show:

- Spelling accuracy according to PUEBI: V = 1.00

- Punctuation accuracy: V = 0.96

- Sentence structure clarity: V = 0.93

- Alignment with primary school students' abilities: V = 0.89

- Use of communicative language: V = 0.93

- Consistency of terminology: V = 1.00

The validator provided minor suggestions to simplify several complex sentences and to adjust technical terms to make them more familiar to primary school students.

4. Media Expert Validation Results

Media validation was conducted by 3 educational technology experts with the following results:

Table 5: *Media Expert Validation Results*

Aspect	Number of Items	Average V	Category
Display Quality	5	0.93	Highly Valid
Audio Quality	4	0.89	Very Valid
Technical (Performance & Compatibility)	4	0.92	Highly Valid
Interactivity	4	0.96	Highly Valid
Pedagogical	5	0.91	Highly Valid
Overall Average	**25**	**0.91**	**Highly Valid**

Detailed results show:

- Visualisation quality of style and movement: V = 0.96

- Animation/simulation quality: V = 0.93

- Readability of formulas and symbols: V = 0.89

- Design consistency: V = 0.93

- Application stability and performance: V = 0.

- Responsiveness of interactive simulation: V = 1.00

- Quality of feedback for understanding: V = 0.93

- Promoting student interest: V = 0.96

- Alignment with VAK learning styles: V = 0.89

The validator recommends improving the quality of the narrative audio and optimising loading for limited internet connections.

5. Summary of Validation Results

Summary of expert validation results:

Table 6: *Summary of Validation Results*

Type of Validation	Number of Validators	Number of Items	Average V	Category
Content Validity (Material)	3	15	0.925	Highly Valid
Language Validity	3	25	0.940	Highly Valid
Media Validity	3	25	0.910	Highly Valid
Total Average	9	65	0.925	Highly Valid

Distribution of validity categories:

- Highly Valid (V ≥ 0.80): 62 items (95.4%)

- Valid (0.60 ≤ V < 0.80): 3 items (4.6%)

- Not Valid (V < 0.60): 0 items (0%)

The validation results show that all items in the instrument fall within the 0.67-1.00 range, with most falling into the highly valid category. There are no items to be eliminated, but minor revisions were made based on the validator's suggestions, particularly for language simplification and technical optimisation of the media.

6. Product Revision Based on Validation

Revisions were made based on validator feedback:

Revision of Material Aspects:

- Adding contextual examples to the concept of friction

- Strengthening the relevance of the material to the Pancasila Student Profile

- Adding variations of questions on application in daily life

Revisions to Language Aspects:

- Simplify 5 complex sentences into simple sentences

- Replacing 3 technical terms with more familiar equivalents

- Improving consistency in the use of terms in 2 questions

Media Aspect Revision:

- Improving the quality of audio narration in 3 materials

- Optimising image file sizes to speed up loading

- Adjusting colour contrast in 2 slides for better readability

- Adding alternative visual feedback for variation

Small Group Trial Results

1. Test Subject Profile

The small group trial involved 6 fifth-grade students from SDN 02 Sokawangi who were selected heterogeneously:

- 2 students with high academic ability

- 2 students with average academic ability

- 2 students with low academic ability

2. Trial Procedure

The trial was conducted in stages:

- Pretest (20 multiple-choice questions, duration 30 minutes)

- Learning using Quizizz media (60 minutes)

- Post-test (20 multiple-choice questions equivalent to the pre-test, duration 30 minutes)

- Observation of the learning process and student engagement

- Brief interview about the experience of using Quizizz

3. Student Learning Outcomes

Results of the small group trial test:

Table 7: *Student Learning Outcomes*

Type of Test	N	Average	Primary	Highest Score	Lowest Score	Mastery (≥75)
Pre-test	6	43.75	13.98	62.5	25	0% (0 students)
Post-test	6	93.33	7.53	100	80	100% (6 students)
Improvement		**49.58**				**100**

4. N-Gain Analysis

N-Gain calculation to measure the initial effectiveness of the media:

$$g = \frac{93.33 - 43.75}{100 - 43.75} = 0.86$$

The N-Gain value of 0.86 falls into the **high** category ($g \geq 0.7$), indicating that the Quizizz medium is highly effective in improving understanding of the concepts of force and motion in the initial trial phase.

5. Results of Student Engagement Observations

Observations during the learning process showed:

- All students (100%) actively participated in the learning process

- 5 out of 6 students (83%) demonstrated high enthusiasm

- 6 out of 6 students (100%) were able to operate Quizizz without any problems

- 5 out of 6 students (83%) participated in discussions when questions arose

- 6 out of 6 students (100%) gave positive responses to the gamification feature

6. Identification of Obstacles and Improvements

Several minor technical obstacles were identified:

- 1 student experienced loading delays due to a slow internet connection

- 2 students needed more time to adapt to the Quizizz interface

Improvements made:

- Added clearer visual instructions

- Optimised the size of multimedia content for limited internet connections

- Preparing an alternative offline mode for learning content

Needs Analysis from a Theoretical Perspective

The results of the needs analysis show that teachers and students have a high need for interactive digital learning media, with an average score of 3.50 (teachers) and 3.30 (students). These findings reflect the gap between conventional learning practices and the demands of IPAS learning in the digital age.

Theoretically, this high demand can be explained through Vygotsky's social constructivism theory (1978), which emphasises that effective learning occurs when students actively construct knowledge through interaction with their environment and social mediation. Quizizz provides a learning environment that supports the Zone of Proximal Development (ZPD) through collaboration features, healthy competition, immediate feedback, and teacher scaffolding, as well as comprehensive results reports.

The high scores in the aspects of technological experience and educational games (3.55; 71%) confirm that the current generation of students is digital natives who have adequate digital literacy. Prensky (2001) explains that digital natives have different learning preferences,

favouring interactive, visual, and game-based learning. This reinforces the argument that the integration of technology in learning is not merely an option, but an urgent pedagogical necessity.

The finding that 96% of teachers require a variety of methods and 95% of teachers need interactive media aligns with research by Lestari et al. (2024), which shows that teachers view Quizizz as an innovative solution to overcome the boredom of conventional learning. This also reinforces Mayer's (2020) argument about the importance of multimedia in accommodating various student learning styles.

The Suitability of Quizizz Media as a Learning Product

Expert validation results indicate that Quizizz media meets the feasibility criteria with an average Aiken index of 0.925 (highly valid). This high validity indicates that the media is aligned with learning objectives, the cognitive characteristics of primary school students, and instructional design principles.

Content validity (V = 0.925) indicates that the media content aligns with the IPAS Phase C Learning Outcomes, with the concepts of force and motion presented accurately and the material relevant to students' lives. This aligns with Ausubel's meaningful learning principle, which emphasises the importance of linking new knowledge to students' prior knowledge and real-life contexts.

Language Validity (V = 0.94) confirms that the language used is appropriate for the cognitive development level of fifth-grade students, who are at Piaget's concrete operational stage. The use of communicative language, effective sentences, and familiar terms facilitates students' understanding of abstract concepts such as style and movement.

Media Validity (V = 0.91) indicates that the visual design, interactivity, and gamification features have been well designed to increase student engagement. These findings reinforce Sweller's Cognitive Load Theory**,** whereby good multimedia design can reduce extrinsic cognitive load and improve the processing of relevant information.

Consistency of validation results with previous studies—Permatasari et al. (2024) with a validity of 94%, Rosman (2024) with a validity of 92.18%–97.22%, and Rahmawati & Farida

(2024) with a validity of 86.25%–100%—reinforce empirical evidence that Quizizz is a reliable platform to be developed as a medium for IPAS learning in primary schools.

Minor revisions made based on validator suggestions actually indicate a high level of professionalism in product development. This iterative process aligns with the formative evaluation principle in the ADDIE model, which emphasises continuous improvement to enhance product quality.

Initial Effectiveness of the Quizizz Medium

Small-group trials showed very high effectiveness, with an average score increase from 43.75 to 93.33 (N-Gain = 0.86; high category) and 100% classical mastery. These findings provide preliminary empirical evidence that Quizizz is effective in improving understanding of the concepts of force and motion.

This high effectiveness can be explained through several theoretical perspectives:

1. Dual Coding Theory (Paivio, 1991)

Quizizz integrates text, images, videos, and animations simultaneously, facilitating information processing through two channels—verbal and visual. When information is conveyed through multiple channels, students can form stronger mental representations and improve knowledge retention.

2. Gamification and Intrinsic Motivation Theory

Quizizz's gamification features—points, leaderboards, instant feedback, and motivational memes—meet three basic psychological needs in **Self-Determination Theory** (Deci & Ryan):

- **Competence**: Students feel capable when they successfully answer questions and earn points

- **Autonomy**: Students have control over their learning pace and answering strategies

- **Relatedness**: Healthy competition through leaderboards fosters social connections

Research **by Sailer & Homner** (2020) shows that gamification effectively increases intrinsic motivation, which in turn increases engagement and learning outcomes.

3. Feedback Theory

The instant feedback provided by Quizizz allows students to engage in metacognitive monitoring—identifying conceptual errors and correcting their understanding in real time. Hattie & Timperley (2007) in their research on feedback stated that timely, specific, and constructive feedback is one of the most influential factors on learning outcomes (effect size = 0.79).

4. Flow Theory (Csikszentmihalyi, 1990)

The progressively difficult questions in Quizizz facilitate the creation of a flow state—a condition in which students are highly focused, challenged but not overwhelmed, and enjoy the learning process. Observations indicate that 83% of students exhibit high enthusiasm and 100% actively participate in learning, suggesting the achievement of a flow state.

The results of student engagement observations—100% were able to operate Quizizz without any problems, 83% participated in discussions, and 100% responded positively to the gamification feature—reinforce the quantitative findings. This aligns with research by Quispe Ccoa et al. (2023), which shows that Quizizz increases motivation (from 50% intrinsic to 60%), reduces stress (from 90% to 60%), and increases pass rates (from 60% to 75%).

STUDY LIMITATIONS

1. **Internet Dependency**: Requires a stable internet connection, which may be a constraint in areas with limited infrastructure

2. **Digital Literacy**: Students with low digital literacy require a longer adaptation period

3. **Potential Distractions**: Gamification elements can distract from learning content if not managed properly

4. **Limitations of Question Types**: More optimal for objective questions, less suitable for complex essay questions

Identifying these limitations is important for product improvement and further research.

Theoretical and Practical Implications

Theoretical Implications:

This study enriches learning theory by demonstrating that the integration of digital technology in science, technology, engineering, and mathematics (STEM) learning, particularly through the Quizizz gamification platform, can significantly improve the learning outcomes of primary school students. These findings confirm the relevance of constructivism theory, gamification theory, and multimedia learning theory in the context of Indonesian primary education.

This study also contributes methodologically to the development of learning media, demonstrating that the ADDIE model with comprehensive validation using the Aiken index is an effective approach to ensuring the quality of learning products.

Practical Implications:

1. **For Teachers**: Quizizz can be used as an innovative alternative to improve the quality of IPAS learning, with usage guidelines provided

2. **For Schools**: Investment in technological infrastructure (internet, devices) and teacher training is needed to optimise digital learning

3. **For Curriculum Developers**: These findings can serve as a reference for integrating learning technology into the Merdeka Curriculum

4. **For Researchers**: This research opens up opportunities for further research on long-term effectiveness, impact on higher-order thinking skills, and implementation in other subjects or materials

CONCLUSION

Based on the research results and discussion, it can be concluded that:

1. **Needs Analysis**: Teachers and students have a high need for Quizizz interactive learning media, as indicated by an average score of 3.50 (teachers; 70%) and 3.30 (students; 66%). The highest aspects are the perception of Quizizz's effectiveness (teachers: 3.52) and students' technological experience (3.55; 71%), indicating that this media is feasible and relevant to be developed for IPAS learning in primary schools.

2. **Product Feasibility**: The developed Quizizz learning media has met the criteria of being highly valid based on expert validation with the Aiken index: content validity 0.925 (80% of indicators reached 1.00), language validity 0.94, and media validity 0.91.

All 65 items of the instrument were in the range of 0.67-1.00, with 95.4% reaching the highly valid category (V ≥ 0.80). No items needed to be eliminated, but minor revisions were made to improve the product.

3. **Initial Effectiveness**: A small group trial (6 students) showed high effectiveness with an increase in average scores from 43.75 to 93.33 (N-Gain = 0.86; high category) and 100% classical mastery. Observations revealed that 100% of students were active, 83% showed high enthusiasm, and 100% responded positively to the Quizizz gamification feature.

4. **Research Contribution**: This study contributes a valid, practical, and effective Quizizz learning media product for Grade 5 primary school style and motion material, and enriches the literature on the integration of learning technology in the context of the Merdeka Curriculum.

This study was conducted in accordance with research ethics principles. All participants were involved voluntarily and were informed about the purpose of the study. Participants' identities and data confidentiality were strictly maintained and used solely for academic purposes.

REFERENCES

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum Press.

Dick, W., & Carey, L. (1996). *The systematic design of instruction* (4th ed.). New York: HarperCollins.

Educational Equity Institute. (2024). *Quizizz: Engaging assessment for every student*. Retrieved 21 April 2025, from https://www.quizizz.com

Hake, R. R. (1999). Analysing change/gain scores. *American Educational Research Association's Division D, Measurement and Research Methodology*, 1-4.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*(1), 81–112.

Kartika, A. D. A., & Hidayanto, E. (2025). Increasing student learning activity using the Quizizz application and collaborative methods in mathematics learning. *Journal of Innovation and Teacher Professionalism*, *3*(2), 403-410.

Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia. (2022). *Guidelines for IPAS learning in the Merdeka Curriculum*. Jakarta: Author. https://kurikulum.kemdikbud.go.id/file/cp/dasmen/13.%20CP%20IPAS.pdf?utm_source=chatgpt.com

Lestari et al. (2024). Quizizz in IPAS teaching modules to improve primary school students' science literacy. *Journal of Education Research*, *9*(2), 134-145.

Maesaroh, S. (2022). Development of Quizizz interactive media based on blended learning in science content for fifth-grade students at SDN Prampelan 1 Sayung. [Unpublished thesis]. Sultan Agung Islamic University.

Mayer, R. E. (2020). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review*, *36*(8), 1-15.

Mulyani, S., et al. (2025). Validity and reliability of the Indonesian version of the ADQ. *BMC Medical Education*, *25*, 798.

Setianingsih, O, et al. (2025). The Effect Of The Use Of Quizlet And Mime Game Media On The Mastery Of Descriptive Text Vocabulary Of Grade Vii Students. *Scientific journal of basic education,* 10,359. https://doi.org/10.23969/jp.v10i03.30667

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology*, *45*(3), 255-287.

Permatasari et al.(2024). Development of Quizizz Indonesiaku kaya raya gamification media for IPAS learning in fifth grade students. *Pendas: Journal of Primary Education*, *9*(3), 1580-1592.

Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities Press.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, *9*(5), 1-6.

Putra, A. D., & Salsabila, H. (2021). The influence of interactive media in the development of learning activities in educational institutions. *Curriculum Innovation*, *18*(2), 231-241.

Quispe Ccoa, N. M., Farfan Choquehuanca, M. E., & Rucano Paucar, F. H. (2023). An application of the Quizizz gamification tool to improve motivation in the evaluation of primary school students. *Science Education Journal*, *5*(2), 120-135.

Rahmawati, R., & Farida. (2024). Development of interactive learning media based on the Quizizz game in IPAS learning for fifth grade elementary school students. *Journal of Basic Education Studies*, *7*(1), 173-186.

Richey, R. C., & Klein, J. D. (2007). *Design and development research: Methods, strategies, and issues*. Mahwah, NJ: Lawrence Erlbaum Associates.

Rosman, M. (2024). Development of interactive learning media based on the Quizizz game for IPAS lessons in Grade IV of elementary school. [Unpublished thesis]. Bung Hatta University.

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, *32*(1), 77–112.

Sugiyono. (2019). *Research and development methods (Research and Development/R&D)*. Bandung: Alfabeta.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Yong, A., & Rudolph, J. (2022). A review of Quizizz—A gamified student response system. *Journal of Applied Learning & Teaching*, *5*(1), 146-155.